Microcor® Data Logger

Reference Manual

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Table of Contents

Chapter 1 Introduction… 1

Chapter 2 Specification 2

Chapter 3 Required Equipment 3

Chapter 4 MDL Configuration 4

Microcor Tools Method 6

CheckMate DL Method 9

Chapter 5 Retrieval and Plotting Data 14

Chapter 6 Physical Installation 17

Power Module Installation 17

Mount the Transmitter 18

Direct Probe Mounting 18

RCS Mounting Accessories 19

Appendix A Product Certifications 21

Chapter 1
Introduction
Microcor® Data-Logger

The Microcor® Data-Logger (MDL) is based on RCS's latest generation of high-resolution Microcor technology. The MDL operates in conjunction with the high-resolution Microcor probes that RCS offers. The Microcor Data-Logger is an 18 bit high-resolution corrosion measurement device, approximately 256 times higher than previous electrical resistance measurement instruments. This increased resolution greatly improves response to corrosion upsets, and at the same time allows measurements to be made in virtually any environment. The patented technology combines speed of response, similar to linear polarization resistance, with the universal applicability of electrical resistance measurements.

The scope of this manual is to cover all the necessary equipment and settings required to start up and configure your MDL. If this manual is followed completely, you will have the necessary instructions to have your data logger up and running smoothly. This manual will not cover the connection of any equipment outside of RCS equipment, nor will it cover settings not used by RCS equipment.

Chapter 2
Specifications

Mechanical Specifications:

- Weight: 7.5 lbs (3.4kg)
- Dimensions: 6.38” x 4.40”

Electrical Specifications:

- Resolution: 18 bit (1 part in 262,144)
- Power Supply: 7.2V Lithium Power Module
- Probe compatibility: All Microcor Probes
- Operating Temperature Range: -40C to +70C
- Maximum Data Storage: 8000 Readings (Circular Buffer)
- Battery Life: 3 years at 10 min measurement interval
- Communications: Microcor Tools
- Handheld: Checkmate DL
- Proprietary communications protocol

Chapter 3
Required Equipment

The following lists the equipment required to correctly setup and run a Microcor Data-Logger.

Hardware Requirements:

- Microcor Data-Logger (MDL)
- Checkmate DL handheld (Hazloc area)
- Power Module
- USB to Serial Adapter
- Limo to Serial cable

Software Requirements:

- Microcor Tools Ver. 5.0 or Greater

PC must meet the following requirements:

Operating System Requirements:

- Windows 2000, service pack 4
- Windows Server 2003 or newer
- Windows XP (Home or Professional), service pack 1 or higher (If the operating system requirement is not met, the setup will display a message and stop).

If the user manual is being installed, the following application is also required:

- Adobe® Acrobat® 5.0 (or newer)

Hard disk space Requirements:

- Maximum installation (including all upgrades performed by the setup disc): 250 MB

Chapter 4
MDL Configuration

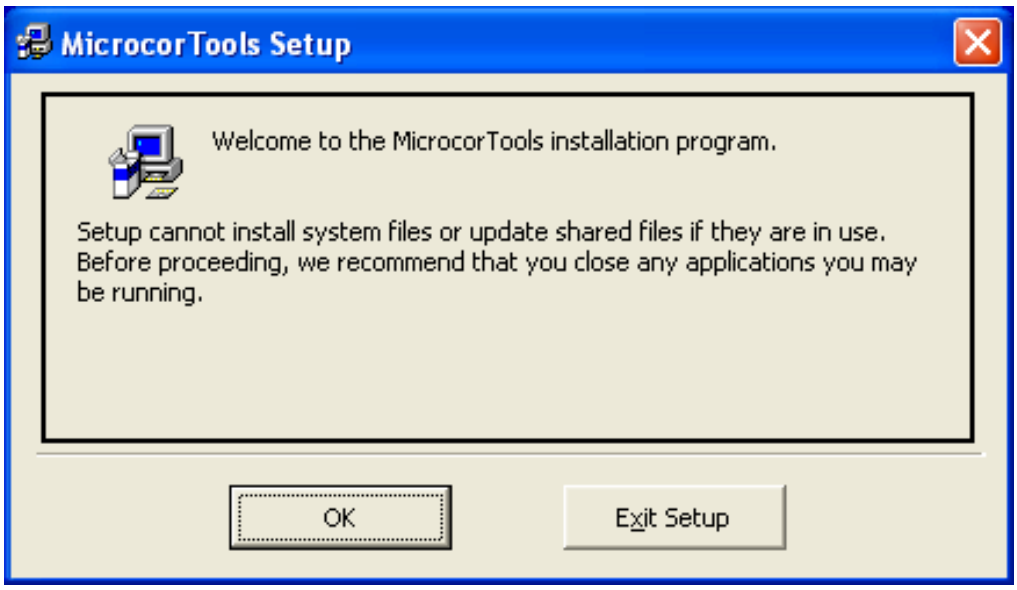
This chapter will cover the options available for configuration of the MDL. Option 1 is use of Microcor Tools configuration software in a non-hazardous location. A local connection between a PC/Laptop and the MDL needs to be established. In addition to configuration, Microcor Tools is also used to download and analyze the MDL data. Supplementary data analysis is covered in the Microcor Tools Manual. Option 2 is use of the Checkmate DL handheld. The Checkmate DL is a Hazloc Zone I approved device that will configure your MDL and act as a shuttle device for downloading data.

Checklist

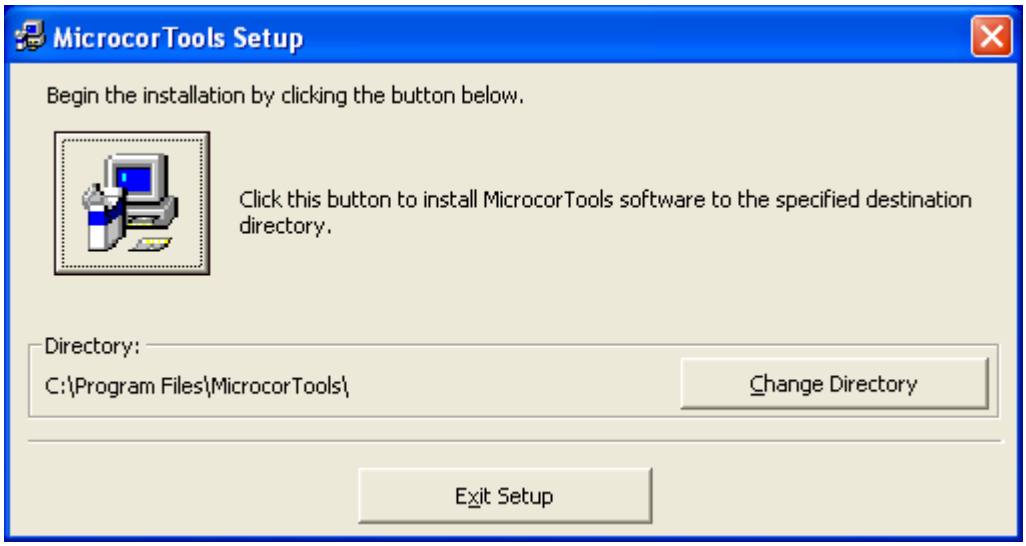
- ✓ Install Microcor Tools Software (Non-Hazloc area).
- ✓ Be sure the power module is installed in the MDL prior to start of configuration.
- ✓ Connect the communication cable (PN: 748110-9A) to both the computer and the MDL.
- ✓ If using USB to RS232 adapter, be sure to install supplied drivers by the manufacturer.

Installation

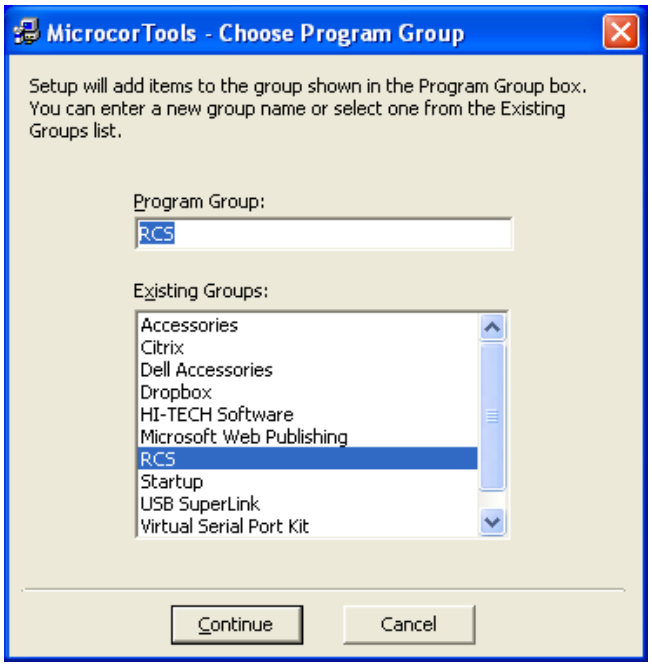
1. Install Microcor Tools Software
   a. Insert the Setup and Installation CD that was included with the MDL Installation Kit.
   b. Click **Install/Setup** and follow screens shown below.
   c. Click **OK.**



d. Leave the default directory shown, click on the **icon** to continue.

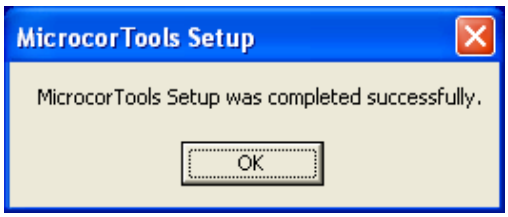


e. Leave the default Program Group, click on **continue** to proceed.



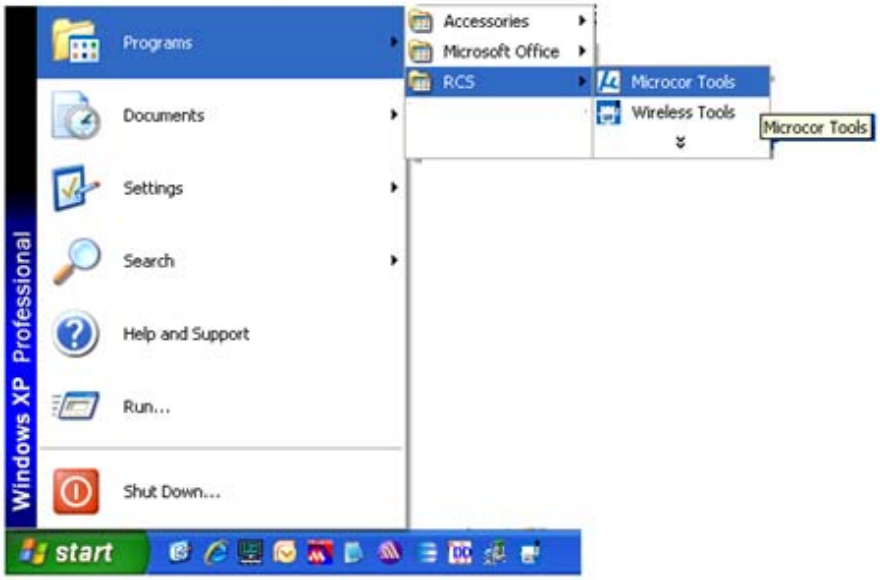
*Note: If any Version Conflict is prompted, click **yes** to keep your existing files.

f. Setup is complete, click **OK**.

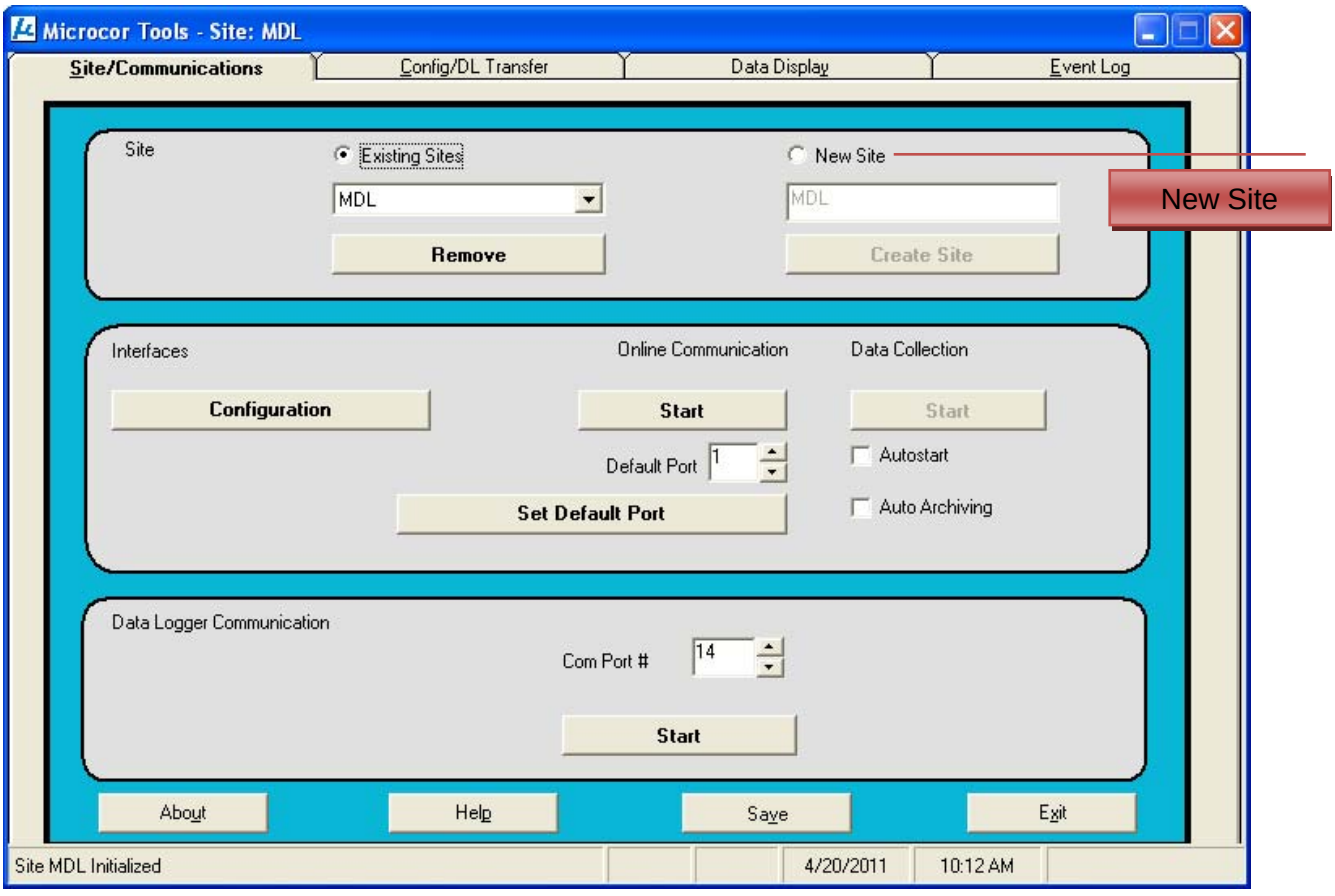


Microcor Tools Configuration Method (Software)

1. Run Microcor Tools

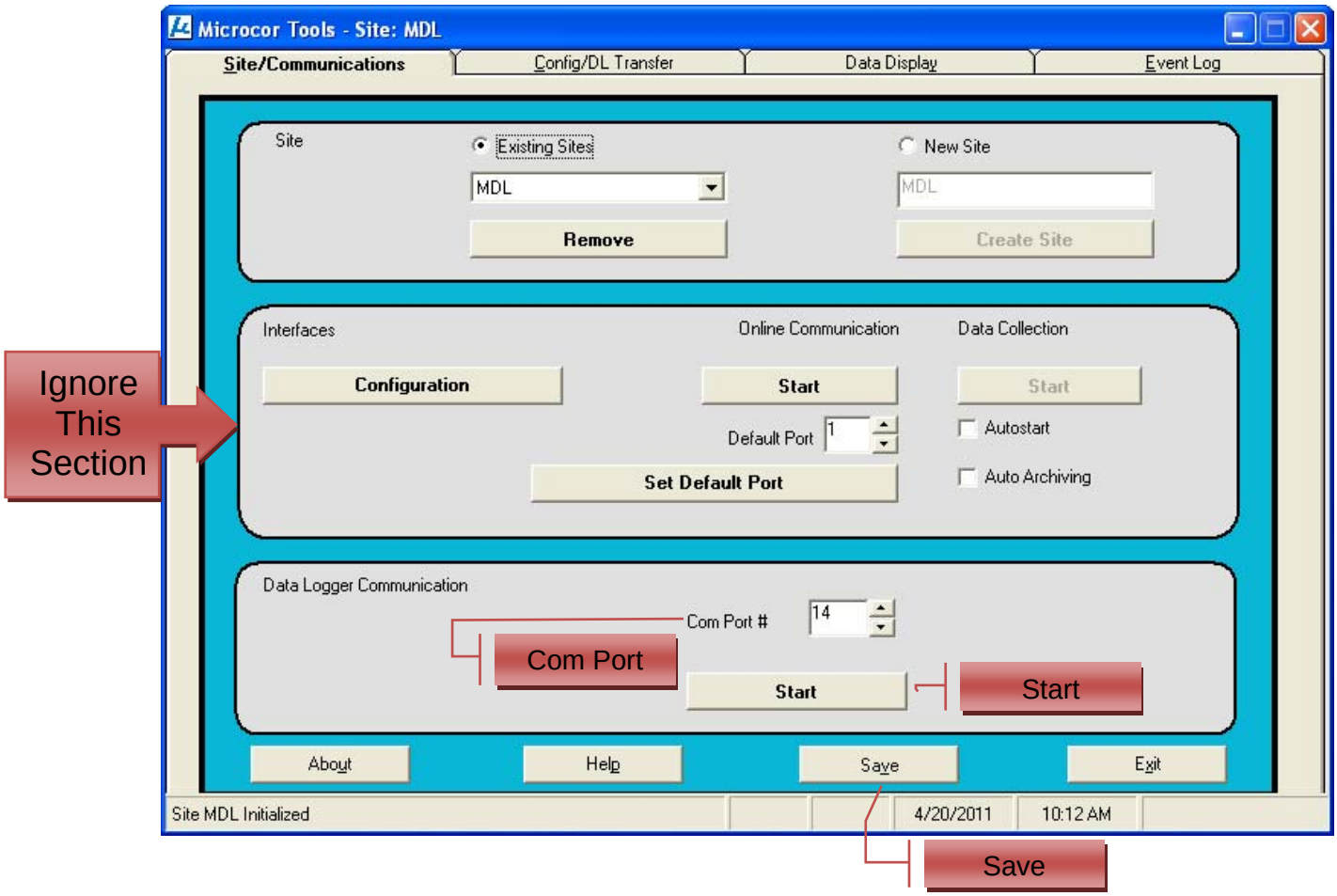


2. Create a "New Site" if one has not been created already.



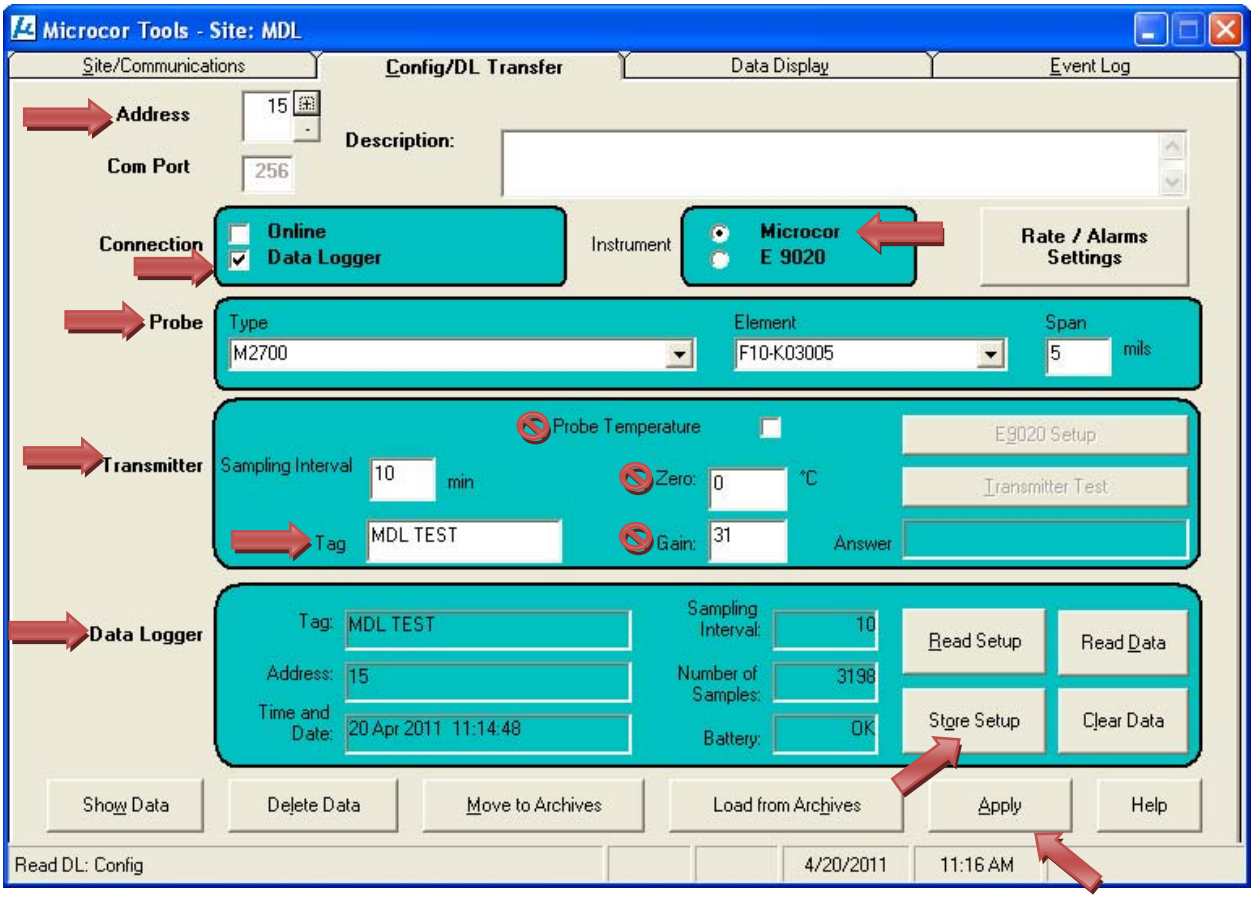
3. Initialize Data-Logger Communication

a. Select Com Port (This can be found in device manager of the PC).
b. Save Site Configuration.
c. Start Communication.



4. Configure (Configure/DL Transfer Tab)

a. Select an Address to use by clicking the **+** or **–** buttons (**0 to 99**).
b. Check **Data Logger** as Connection type.
c. Select probe and element type from drop down menus.
d. Input the probe span.
e. Input desired sampling interval (**10-60**).
f. Input desired tag name.
g. Click **Store Setup** to initialize configuration.
h. Click **Apply** to save configuration.



i. To modify configuration, edit white text fields and click **Store Setup** followed by **Apply**.

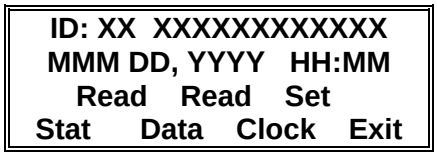
The MDL is now configured and ready to take Measurements. Go to Data Display section to read instructions on retrieving and viewing data.

CheckMate DL Method (Hardware – Hazloc Safe)

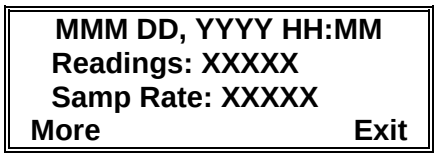
The Checkmate DL is designed to configure and gather data from all Microcor Data-Loggers. The following section will explain the data collection procedure from the Microcor Data-Logger.

1. Read Data-Logger Configuration and Status

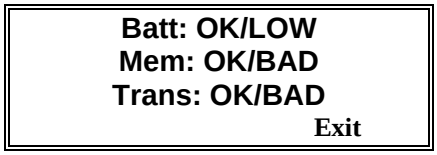
Configurations already set into the Data-Logger are easily read with the Checkmate DL. Connect the Checkmate DL to the Data-Logger with the provided adapter cable connector. From the **Standby** screen, press **Read (F1)** to proceed to the following display with the attached Data-Logger information:



Press **Read Stat (F1)** to display the Data-Logger time, number of readings and the sample rate as shown below:

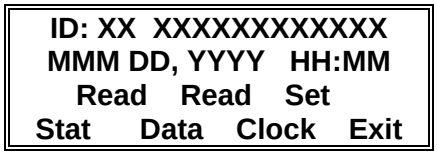


Press **More (F1)** to continue to the next display which shows the battery, memory and transmission information as shown below. Battery status will show **OK** or **LOW**. Memory and Transmission will show **OK** or **BAD** depending on their status.



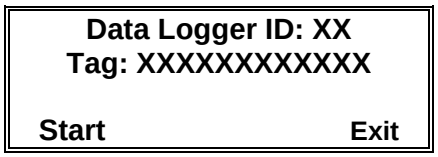
2. Reading / Clearing Data from Microcor Data-Loggers

To read a Data-Logger, connect the Checkmate DL to the Data-Logger with the provided adapter cable connector. From the **Standby** screen, press **Read (F1)** to proceed to the following display with the attached Data Logger information:

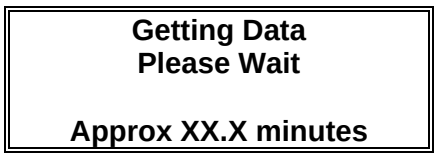


Press **Read Data (F2)**; Checkmate DL will perform a series of internal checks and proceed accordingly. First, Checkmate DL will check whether the ID is properly assigned. If the ID is not properly assigned, it will prompt the user to set the Data-Logger ID and the Tag information. It

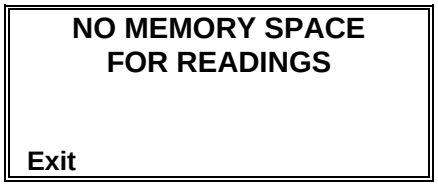
will then determine if any readings for this ID are stored in the Checkmate DL. If any data for the ID exists in the Checkmate DL, then the user will be prompted to either **Overwrite (F1)** or **Abort (F4)**. Overwriting will delete the existing data for that ID and replace it with the new data being read. Once these internal checks are performed and any issues resolved, Checkmate DL will proceed to the following screen:



Press **Start (F1)** from the above screen to begin the read process. The Checkmate DL will show the following screen during data transfer.



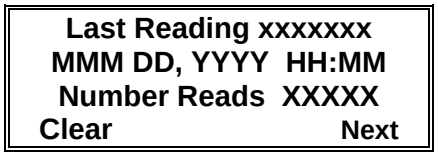
If "**NO MEMORY SPACE FOR READINGS**" screen appears (shown below), then the Checkmate DL memory will need to be cleared before transferring the data. It is recommended that ALL existing data on the Checkmate DL be transferred to a PC prior to erasing ANY data. Refer to the section on **Clearing the Checkmate DL Memory** on the Checkmate DL reference manual.



Once the data is successfully read and transferred, it is displayed as shown below. Users can at this time elect to delete the Data-Logger content if desired.

Note: All data stored for the ID on the Checkmate DL will be erased if "**Clear**" button is pressed.

Press **Clear (F1)** to clear Data-Logger readings or **Next (F4)** to return back to the Data-Logger information screen without clearing the readings.



WARNING! It is recommended to clear the data in the Data-Logger after transfer to the Checkmate DL. This reduces the amount and time of data transfer for future downloads. The data is then appended to the previous data when transferring the data from the Checkmate DL to the PC. Refer to the **Transferring Collected Data from Checkmate DL to PC** section.

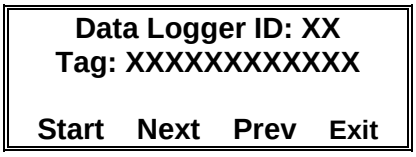
3. Transferring Collected Data from Checkmate DL to PC

Data-Logger data is downloaded to the PC using the provided Microcor Tools Software program. Connect the Checkmate DL instrument to the 9 pin serial port on the PC using the provided cable. If there is no serial port in the computer, use the included serial-to-USB converter cable to complete the connection. Make sure to set the correct COM port number on the Microcor Tools Software program **Data-Logger Communication** area (in most cases this will be COM 1, however verify this in the device manager).

Checkmate DL Data Transfer Procedure

From the **Standby** screen, press **Data (F3)** to advance to the following display:

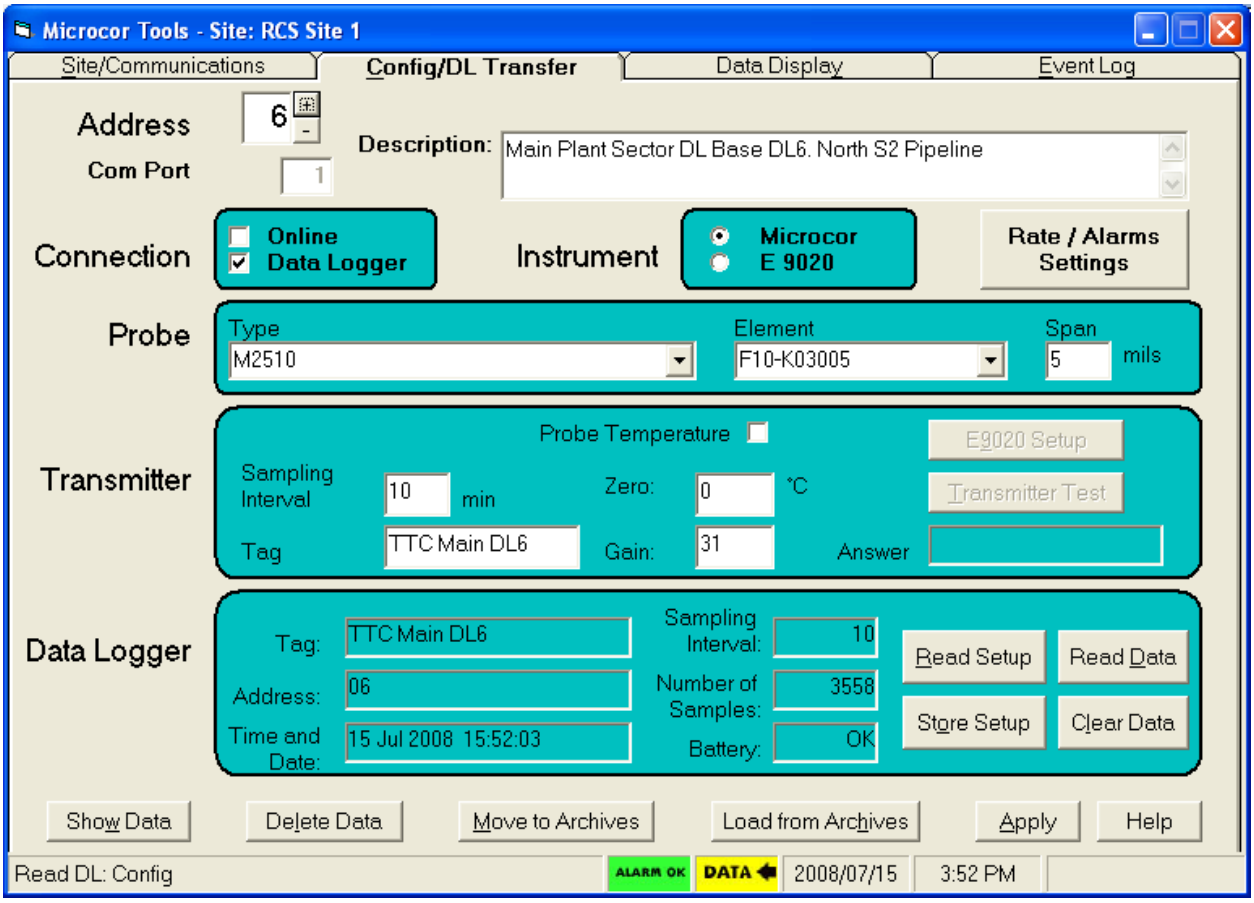
Press the **Start (F1)** to proceed to the next screen. Use **Next (F2)** and **Prev (F3)** to navigate the ID list (0 – 99) and select the desired ID to transfer data (shown below).



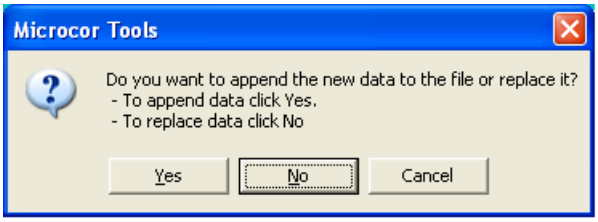
Once the ID is selected, press **Start (F1)**. Following screen will appear:

Note: Make sure that the data (ID of the Data-Logger) set in the Checkmate DL to be transferred corresponds with the **Address** selected in the Microcor Tools Software before transferring the data.

Data is now ready for transfer from the Checkmate DL to the PC. On the Microcor Tools Software program, select the **Site** and navigate to the **Config/DL Transfer** screen, select the **Address** and choose **Data Logger** as the **Connection** type and **Microcor** as the **Instrument** (see image below). Click the **Read Data** command button to begin the transmission. It is also possible to click the **Read Setup** command button to transfer the configuration data of the data-Logger to the **Data Logger** section on the **Config/DL Transfer** screen (shown below).



If data already exists for the chosen address, following dialogue box will appear:



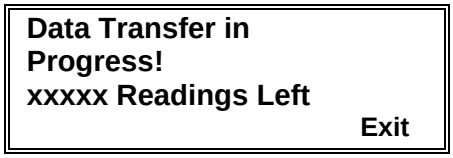
- Press **Yes** to add the new data onto an existing file. This is the normal method if the data in the Data-Logger is deleted after it is collected each time in order to speed data transfer. It also prevents reaching the maximum storage capacity in the data logger at which time the data collection stops.

- Press **No** if all of the data in the Checkmate DL is to replace an existing file. This should be used if the data in the Data-logger is NOT cleared each time it is read. In this case the existing file is automatically archived.

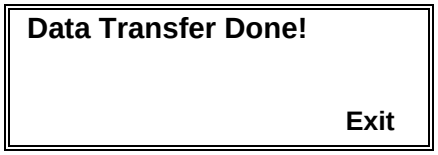
- Press **Cancel** to exit the **Read Data** function.

Note: The Microcor Data-Logger will store up to 8000 readings before collection memory is fully allocated, then the collection of data will halt until data is cleared from memory.

After a selection has been made, a counter in the status bar indicates the number of samples to be transferred. Status bar will read **End of Transfer** when the data is successfully transferred from the data logger to the **Microcor Tools** program. During the data transfer, the following screen will be displayed on the Checkmate DL:



The number of readings (xxxxx) counts down as the data is transferred to Microcor Tools. Upon successful transmission, Checkmate DL will show the following screen:



Press **Exit (F4)** to return to the Data Transfer screen to choose another ID for data transfer.

Note: Information from only one Data-Logger can be transferred at a time, when transferring information of more than one Data-Logger, **change the Address on the Microcor Tools Software program for each transfer** so that all data is not transferred only to one ID address.

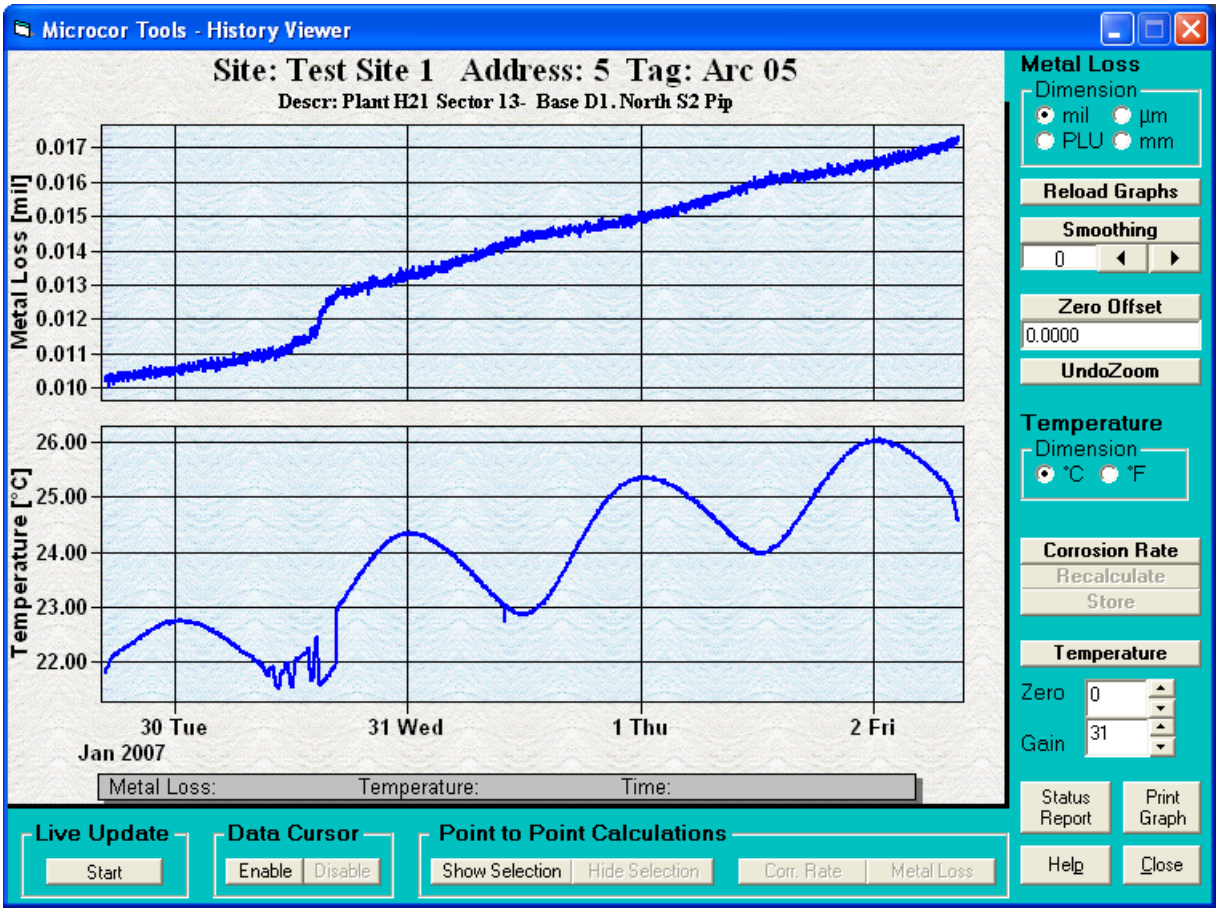
In case of any error messages displayed on Checkmate DL, check connections between Checkmate DL and the PC, make sure that Microcor Tools Software program is running and that the correct COM port is selected.

If data is still not transferred after checking the connection between the PC and Checkmate DL, please see the Troubleshooting section for further help.

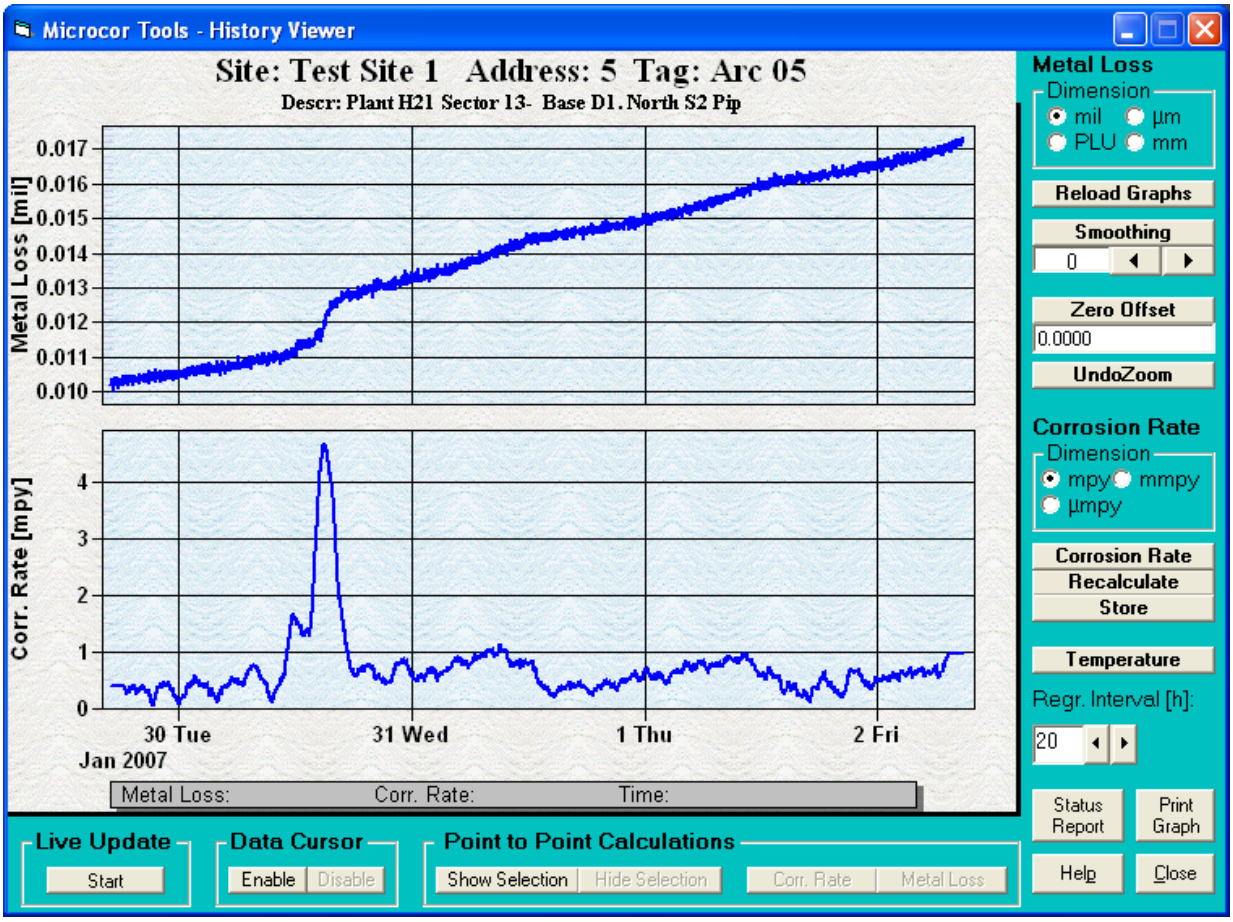
Chapter 5
Retrieving and Plotting Data

Microcor Tools allows retrieving and plotting of corrosion data. **Microcor Tools – History Viewer** can be used to view data collected **Online** or by **Data-Logger** connection methods.

To open the **Microcor Tools – History Viewer** (graph feature), select the site from the **Site/Communications** tab, select the **Address** from the **Config/DL Transfer** tab, and click the **Show Data** command button**.** Alternate method to enter the **History Viewer** is to navigate to the **Data Display** tab and double-clicking the **Tag** of the desired unit.



In the above screen, the top graph is the **Metal Loss** and the bottom graph presents the probe **Temperature** (when applicable). The bottom graph can be switched to show the **Corrosion** or **Erosion Rate** for the same set of data when the **Corrosion** or **Erosion Rate** button is selected.



To show the corrosion rate graph, click the **Corrosion** or **Erosion Rate** command button (see section below for more details). Click the **Temperature** command button to display the probe temperature graph.

Note: The **Temperature** graph will open as the default bottom graph if the transmitter supports temperature monitoring capabilities and if the **Probe Temperature** check-box is selected; otherwise the graph area will remain blank (to view the **Corrosion** or **Erosion Rate** graph, **Corrosion** or **Erosion Rate** command button must be pressed. It will not open as a default graph). Data-loggers do not support temperature measurements.

Use the upper **Dimension** box (top right-hand corner of the screen) to select the **Metal Loss** Y-axis units in **mils**, **µm**, **mm** or Probe Life Units (**PLU**). Use the lower **Dimension** box (middle right-hand side of the screen) to select units for the **Temperature** graph in **ºC** or **ºF** or **mpy, mmpy** or **µmpy** units if **Corrosion** or **Erosion Rate** graph is selected.

Corrosion/Erosion Rate is calculated by linear regression. This **Regression Interval** may be re-adjusted and the Corrosion/Erosion Rate recalculated by clicking the **Recalculate** command button. The default may suit many online systems but can be changed to optimize noise against sensitivity of the computed corrosion or erosion rate. The **24h Filter** can be enabled at the **Rate/Alarms Settings** area (in the **Config/DL Transfer** screen) to reduce the effects of any diurnal (24) thermal noise. The **Alarm Level** units are directly related to the above selected units and can only be changed by the above settings.

Once the settings have been optimized, the rate data may be saved with the **Store** button. When closing the graphical display window (**History Viewer**) a dialog box will prompt to save the settings. Select **Yes** to store these settings for automatic application to all new data.

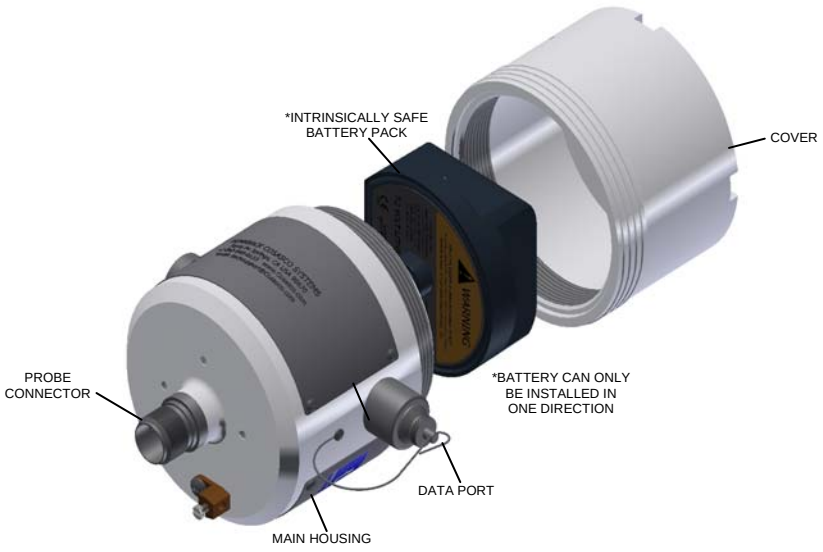
Select (or type in) values for **Zero** and **Gain** to calibrate the measurement. If calibration parameters are unknown for probes and transmitters, select 0 for **Zero** and 31 for **Gain**.

The **Zero Offset** will allow users to change the y-axis reference point to zero (0) by changing the value. This is a helpful feature when conducting tests to graphically view the data from a convenient starting point. It is recommended that this be returned to original value of zero so determination of probe life can be done accurately.

Chapter 6
Physical Installation

Power Module Installation

Ensure that the Power Module is connected to the data-logger. Power Module (RCS P/N 748400) is intrinsically safe and may be connected/disconnected in a hazardous location.



Mount the Data-Logger

The data-logger can be installed on the top, side, or bottom of the line according to the probe installation. Choose the best installation configuration that corresponds to the location of the probe.

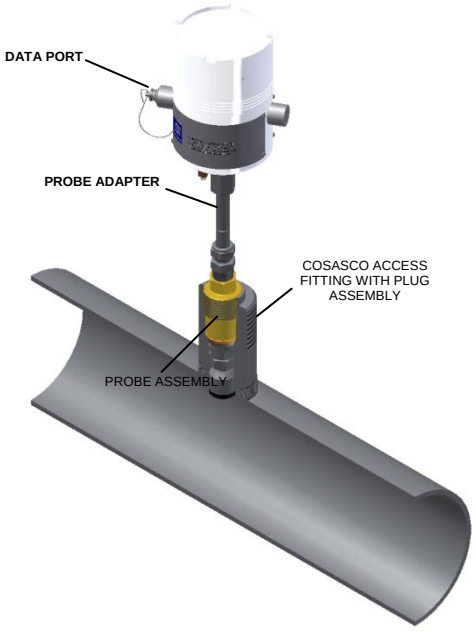
Grounding

A 8 to 14 AWG grounding wire can be attached to the data-logger at the grounding lug. Connect the ground wire to earth ground per local electrical code.

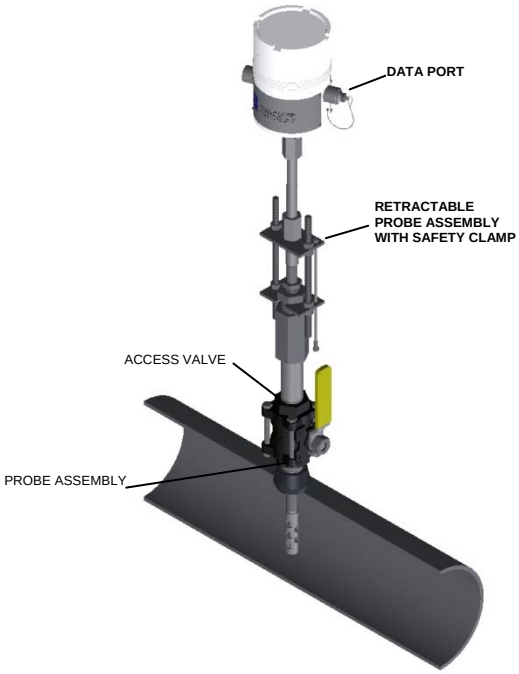
Direct Probe Mounting

Top of the Line

a. Attach connector and tighten connector nut to mount the data-logger to the probe adapter.



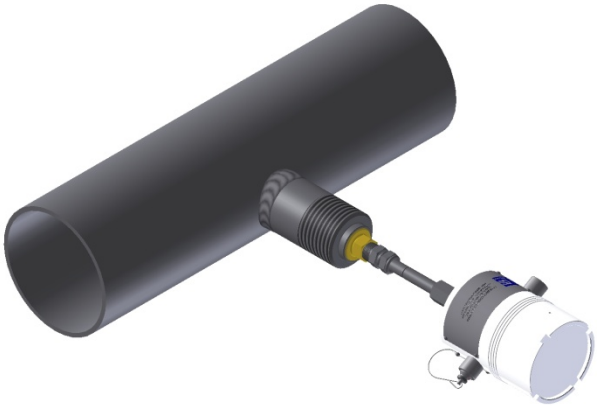
Data-logger Mounted on a Cosasco Access Fitting With Retrievable Probe



Data-Logger With a Retractable Probe Assembly

Side of the Line

a. Attach connector and tighten connector nut to mount the data-logger to the probe adapter.



Data-logger With Fixed Probe Mounted on the Side of the Pipe

Bottom of the Line

a. Attach connector and tighten connector nut to mount the data-logger to the probe adapter.

Data-logger Mounted on the Side of the Pipe

Optional Remote Mounting

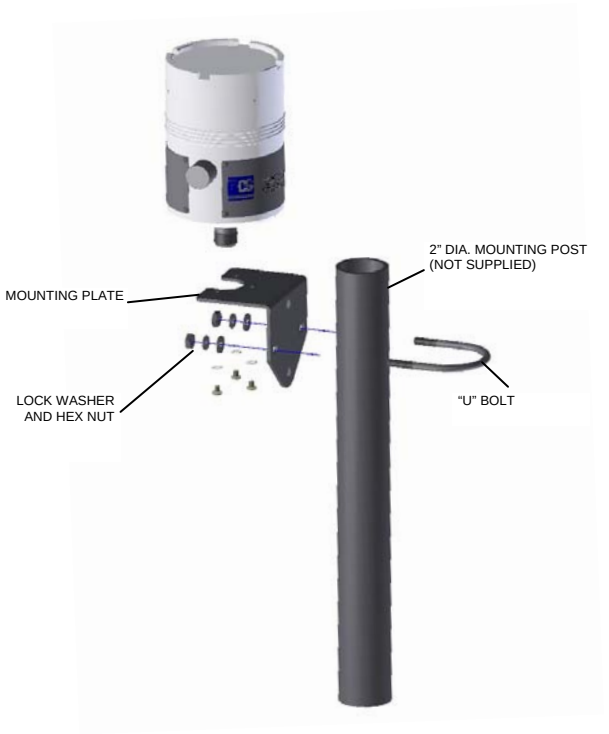
(Bottom of the Line shown)

a. Secure the data-logger to the remote mounting post using appropriate accessories.

b. Attach connector and tighten connector nut of the optional flexible cable to the probe adapter and attach the other end to the data-logger.

Data-logger Mounted in a Remote Location

RCS Mounting Accessories



Appendix A
Product Certifications: PLEASE REFER TO MWT-3905